

WHAT IS CLAIMED IS:

1. A composition for reducing odor comprising:
  - (a) at least one acid having a  $pK_a$  greater than about 2.9 and less than about 6, water solubility less than about 45 g/100g  $H_2O$ , and an oral rat  $LD_{50}$  greater than about 2200 mg/kg;
  - (b) at least one synthetic zeolite having at least about 90 percent  $SiO_2$  tetrahedra oxide units, a capacity for adsorbed water of not greater than about 10 weight percent when measured at 25 °C and water vapor pressure at 4.6 torr, and pore apertures at least about 5.5 Å in diameter, wherein the original water of hydration has been substantially removed; and
  - (c) a substance selected from the group consisting of a metal, metal oxide, a salt of a metal or metal oxide, and any combination thereof.
2. The composition of claim 1 wherein said acid is at least one acid selected from the group consisting of an organic acid, amino acid and any combination thereof.
3. The composition of claim 1 wherein said metal oxide is selected from the group consisting of zinc oxide, copper oxide, iron oxide, manganese oxide, tin oxide and silver oxide.
4. The composition of claim 1 wherein said metal is selected from the group consisting of zinc, copper, iron, manganese, tin and silver.
5. The composition of claim 1 wherein said salt is selected from the group consisting of a salt of zinc, copper, iron, manganese, tin and silver.

6. The composition of claim 1 further comprising an article or substance that, in the absence of said composition for reducing odor, emits an odor during use.
7. The composition of claim 6 wherein said article or substance is at least one selected from the group consisting of personal care articles, foot powders, laundry  
5 preparations, pet litters, cleaning products and deodorizers.
8. The composition of claim 1 having about (i) 33 to about 99% acid, (ii) about 0.5 to about 40% metal, metal oxide or salt of a metal or metal oxide, and (iii) about 5 to about 50% synthetic zeolite, wherein the sum of (i), (ii) and (iii) is 100%.
9. The composition of claim 8 having about 88 to about 89.5% acid, about 0.5 to  
10 about 2% metal, metal oxide or salt of a metal or metal oxide and about 9 to about 11% synthetic zeolite.
10. The composition of claim 8 having about 90 to about 94% acid, about 1 to about 3% metal, metal oxide or salt of a metal or metal oxide and about 5 to about 7% synthetic zeolite.
- 15 11. The composition of claim 1 wherein said acid and said metal oxide, metal, or salt of metal or metal oxide combined comprise in the range of about 24% to about 99.7% of the total composition and said zeolite comprises in the range of about 0.3% to about 76% of the total composition.
12. The composition of claim 11 wherein said acid and said metal oxide, metal, or  
20 salt of metal or metal oxide combined comprise in the range of about 50% to about 98% of the total composition and said zeolite comprises in the range of about 2% to about 50% of the total composition.
13. The composition of claim 1 further comprising a diluent.

14. The composition of claim 13 wherein said diluent is sodium bicarbonate or a natural zeolite.
15. The composition of claim 14 wherein said diluent is clinoptilolite.
16. The composition of claim 15 having about 30-38% aspartic acid or fumaric acid, about 0.5-1% ZnO, about 1-2% zeolite, and about 60-67% clinoptilolite.
17. A composition for reducing odor comprising:
- (a) at least one acid selected from aspartic, fumaric, sorbic, tartaric or adipic acid and
  - (b) at least one synthetic zeolite having at least about 90 percent SiO<sub>2</sub> tetrahedra oxide units, a capacity for adsorbed water of not greater than about 10 weight percent when measured at 25 °C and at a water vapor pressure at 4.6 torr, and pore apertures at least about 5.5 Å in diameter, wherein the original water of hydration has been substantially removed; and
  - (c) zinc oxide or zinc sulfate.
18. An odor-controlled article comprising:
- an effective amount of an odor reducing composition, wherein said odor reducing composition comprises (a) at least one acid having a pK<sub>a</sub> greater than about 2.9 and less than about 6, water solubility less than about 45 g/100g H<sub>2</sub>O, and an oral rat LD<sub>50</sub> greater than about 2200 mg/kg, (b) at least one synthetic zeolite having at least about 90 percent of its tetrahedral oxide units as SiO<sub>2</sub> tetrahedra, a capacity for adsorbed water of not greater than 10 weight percent when measured at 25° C and at a water vapor pressure of 4.6 torr, and

pore apertures at least 5.5 Å in diameter, from which the original water of hydration has been substantially removed, and (c) at least one substance selected from the group consisting of a metal, metal oxide, a metal salt, and any combination thereof; and

5 an article that, in the absence of said odor reducing composition, emits odor during use, in contact with said odor reducing composition.

19. The article of claim 18 wherein said acid is at least one acid selected from the group consisting of organic acid, amino acid and any combination thereof.

20. The article of claim 18 wherein said metal oxide is at least one selected from  
10 the group consisting of zinc oxide, copper oxide, iron oxide, manganese oxide, tin oxide and silver oxide.

21. The article of claim 18 wherein said metal is at least one selected from the group consisting of zinc, copper, iron, manganese, tin and silver.

22. The article of claim 18 wherein said salt is at least one selected from the group  
15 consisting of a salt of zinc, copper, iron, manganese, tin and silver.

23. The article of claim 18 wherein said odor emitting article is selected from the group consisting of pads, tissue, lagoons, bandages, dressings, surgical sponges, personal care articles, cleaning products, room deodorizers, vehicle deodorizers, and garbage bags.

20 24. The article of claim 18 wherein said odor reducing composition comprises about (i) 33 to about 99% acid, (ii) about 0.5 to about 40% metal, metal oxide or salt of a metal or metal oxide, and (iii) about 5 to about 50% synthetic zeolite, wherein the sum of (i), (ii) and (iii) is 100%.

25. The article of claim 24 wherein said odor reducing composition comprises about 88 to about 89.5% acid, about 0.5 to about 2% metal, metal oxide or salt of a metal or metal oxide and about 9 to about 11% synthetic zeolite.
26. The article of claim 24 wherein said odor reducing composition comprises  
5 about 90 to about 94% acid, about 1 to about 3% metal, metal oxide or salt of a metal or metal oxide and about 5 to about 7% synthetic zeolite.
27. The article of claim 18 wherein said acid and said metal oxide, metal, or salt of metal or metal oxide combined comprise in the range of about 24% to about 99.7% of the total composition and said zeolite comprises in the range of about 0.3% to about  
10 76% of the total odor reducing composition.
28. The article of claim 27 wherein said acid and said metal oxide, metal, or salt of metal or metal oxide combined comprise in the range of about 50% to about 98% of the total composition and said zeolite comprises in the range of about 2% to about 50% of the total odor reducing composition.
- 15 29. The article of claim 18 wherein said odor reducing composition further comprises a diluent.
30. The article of claim 29 wherein said diluent is sodium bicarbonate or a natural zeolite.
31. The article of claim 30 wherein said diluent is clinoptilolite.
- 20 32. The article of claim 31 wherein said odor reducing composition comprises about 30-38% aspartic acid or fumaric acid, about 0.5-1% ZnO, about 1-2% zeolite, and about 60-67% clinoptilolite.

33. An odor-controlled article comprising:

- (a) an effective amount of an odor reducing composition for controlling odors, wherein said odor reducing composition comprises (i) at least one acid selected from aspartic, fumaric, sorbic, tartaric or adipic acid, (ii) at least one synthetic zeolite having at least about 90 percent  $\text{SiO}_2$  tetrahedra oxide units, a capacity for adsorbed water of not greater than about 10 weight percent when measured at  $25^\circ\text{C}$  and at a water vapor pressure at 4.6 torr, and pore apertures at least about  $5.5 \text{ \AA}$  in diameter, wherein the original water of hydration has been substantially removed, and (iii) zinc oxide or zinc sulfate; and
- (b) an article that, in the absence of said odor reducing composition, emits odor during use, in contact with said odor reducing composition.

34. A method for reducing odor that comprising contacting an effective amount of an odor reducing composition that comprises (a) at least one acid having a  $\text{pK}_a$  greater than about 2.9 and less than about 6, water solubility less than about  $45\text{g}/100\text{g H}_2\text{O}$ , and an oral rat  $\text{LD}_{50}$  greater than about  $2200 \text{ mg/kg}$ , (b) at least one synthetic zeolite having at least about 90 percent of its tetrahedral oxide units as  $\text{SiO}_2$  tetrahedra, a capacity for adsorbed water of not greater than 10 weight percent when measured at  $25^\circ \text{C}$  at a water vapor pressure at 4.6 torr, and pore apertures at least  $5.5 \text{ \AA}$  in diameter, from which the original water of hydration has been substantially removed, and (c) at least one substance selected from the group consisting of a metal, metal oxide, salt of a metal or metal oxide, and any combination thereof, with an article that, in the absence of said odor reducing composition, emits an odor during use, for a

sufficient time to effectively remove said odor; and removing said emitted odor from said odor emitting article.

35. The method of claim 34 wherein said metal oxide is at least one selected from the group including zinc oxide, copper oxide, iron oxide, manganese oxide, tin oxide  
5 and silver oxide.

36. The method of claim 34 wherein said metal is at least one selected from the group consisting of zinc, copper, iron, manganese, tin and silver.

37. The method of claim 34 wherein salt is at least one selected from the group consisting of a salt of zinc, copper, iron, manganese, tin and silver.

10 38. The method of claim 34 wherein said odor emitting article is selected from the group consisting of pads, lagoons, tanks, animal waste, bandages, dressings, surgical sponges, catamenial devices, beef, poultry and fish trays, personal care articles, foot powders, laundry preparations, pet litters, cleaning products, deodorizers, bedding, floors, garbage cans, diaper pails, refrigerators, vehicles, and carpet.

15 39. The method of claim 34 wherein said odor reducing composition comprises about (i) 33 to about 99% acid, (ii) about 0.5 to about 40% metal, metal oxide or salt of a metal or metal oxide, and (iii) about 5 to about 50% synthetic zeolite, wherein the sum of (i), (ii) and (iii) is 100%.

40. The method of claim 39 wherein said odor reducing composition comprises  
20 about 88 to about 89.5% acid, about 0.5 to about 2% metal, metal oxide or salt of a metal or metal oxide and about 9 to about 11% synthetic zeolite.

41. The method of claim 39 wherein said odor reducing composition comprises about 90 to about 94% acid, about 1 to about 3% metal, metal oxide or salt of a metal or metal oxide and about 5 to about 7% synthetic zeolite.
42. The method of claim 34 wherein said odor reducing composition comprises  
5 said acid and said metal substance in the range of about 24% to about 99.7% of the total composition and said zeolite comprises in the range of about 0.3% to about 76% of the total odor reducing composition.
43. The method of claim 34 wherein said composition comprises in the range of about 50% to about 98% of the total composition and said zeolite comprises in the  
10 range of about 2% to about 50% of the total odor reducing composition.
44. The method of claim 34 wherein said odor reducing composition further comprises a diluent.
45. The method of claim 44 wherein said diluent is sodium bicarbonate or a natural zeolite.
- 15 46. The method of claim 45 wherein said diluent is clinoptilolite.
47. The method of claim 46 wherein said odor reducing composition comprises about 30-38% aspartic acid or fumaric acid, about 0.5-1% ZnO, about 1-2% zeolite, and about 60-67% clinoptilolite.
48. A method for removing odor from an odor emitting environment comprising:  
20 contacting an effective amount of an odor reducing composition, wherein said odor reducing composition comprises at least one acid having a  $pK_a$  greater than about 2.9 and less than about 6, water solubility less than about 45 g/100g  $H_2O$ , and an oral rat  $LD_{50}$  greater than about 2200 mg/kg, at least one synthetic zeolite having at least



about 90 percent  $\text{SiO}_2$  tetrahedra oxide units, a capacity for adsorbed water of not greater than 10 weight percent measured at  $25^\circ\text{C}$  and water vapor pressure of 4.6 torr, and pore apertures at least 5.5 in diameter, from which the original water of hydration has been substantially removed, and at least one substance selected from the group  
5 consisting of a metal, metal oxide, a metal salt and any combination thereof, with said odor emitting environment; and allowing a sufficient time to pass for said composition to remove the odor.

49. The method of claim 48 wherein said step of contacting an effective amount of an odor reducing composition with said odor emitting environment comprises  
10 contacting an odor reducing composition, wherein said composition is contained within an article that allows for containment of said composition with said odor emitting environment.